



Analysis of Mathematic Literacy Ability of Junior High School Student Using Android-Based Mobile Learning Media in the Time Covid-19 Pandemic

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Abstract. During the Covid-19 Pandemic the learning system changed the lack of teacher preparation in dealing with these changes has resulted in many adverse effects, one of which is the lack of students' mathematic literacy, so learning media are needed to support the learning process. This study aims to describe the mathematic literacy of junior high school students using android-based mobile learning media during covid-19 pandemic. This research is descriptive research with a qualitative approach. The subjects of the study were seventh grade students consisting of 25 junior high school students who were taken randomly. The instruments used in this study were essay mathematic literacy test sheets and interview test sheets. The data analysis technique used in this research is qualitative and quantitative analysis. Based on the results of the research, the percentage of indicators of mathematic literacy ability has an average formula score of 90%, employs 72% and interprets & evaluates 48%. This study shows that students' mathematic literacy skills can be supported by media mobile learning so as to create effective learning during the Covid-19 Pandemic.

Keywords: Mathematic Literacy Ability · Android-Based Mobile Learning Media · Covid-19

1 Introduction

Mathematics is one of the basic sciences that has a very important role both in everyday life, especially in the development of science and technology, even mathematics can be said to be the root of science [1, 2]. In mathematics, students' abilities are expected not only to be able to count but also to be able to apply it in solving problems of everyday life both in the context of personal, school, work or public environments. Such ability is known as Mathematic Literacy [3, 4].

The definition of mathematic literacy ability according to the draft assessment framework 2021 PISA is a person's ability to reason mathematically and be able to formulate,

Table 1. Indicator mathematic literacy ability

Indicator	Data topic	Code
formulate	Identify important facts and variables from real world problems	F.1
	simplify situations or problems so that the results of the mathematic analysis made can be accepted	F.2
	identify the constraints and assumptions of the chosen mathematical model and the simplified form of its context	F.3
	Represent conditions mathematically, using appropriate variables, diagrams, symbols, and models	F.4
	interpret the problem into sentences that can be understood so as to find a solution	F.5
Employ	Define and apply concepts to get solutions	E.1
	Apply procedures, concepts, mathematical reasoning and facts to solve problems	E.2
	Create diagrams, graphs and mathematical equations to obtain the desired information Generalize the results of applying mathematical procedures to obtain solutions	E.3 E.4
	Correcting and re-explaining mathematical arguments and justifying mathematical results	E.5
Interpret & Evaluate	Interpreting the results obtained in the context of the real world	I.1
	Evaluating the feasibility of applying mathematical solutions to real world problems	I.2
	provide an explanation of the mathematical results obtained make sense or not with the existing problems	I.3
	Understanding the range or limits of mathematic concepts and solutions	I.4
	Criticize and identify model limits that can be used in solving problems	I.5

apply and interpret mathematics into various real-world contexts by involving procedures, concepts, facts and tools to describe, explain, and predict phenomena. Mathematic literacy ability can help someone to know the role and usefulness of mathematics in everyday life and use it to make the right decisions as a 21st century citizen who builds, cares, and thinks. The Organization for Economic Co-operation and Development [5] stated that the indicators contained in Mathematic Literacy include three components of Mathematic Literacy is formulate, employ, and interpret & evaluate each five data topics are explained in Table 1.

However, student literacy in Indonesia is still low according to data obtained from the results International Program Student Assessment (PISA) shows that Indonesia is ranked 73 out of 79 countries in the aspect of mathematic literacy ability, the average score that obtained lower, namely 379 points from the standard provision of 500 points.

Online and offline learning is known in the current era of information technology, online learning is an abbreviation for online learning, or it can be said learning online using the internet network [6, 7]. While offline learning is an abbreviation of learning outside the network or learning offline, it means that learning activities are carried out conventionally as before the Covid-19 Pandemic pandemic but there are certain changes such as shorter lesson hours, less material and giving assignments hard copy to students and then carried out outside of schools [8–10].

One solution that can be done so that the material remains conveyed properly is by using learning media. Most of the mobile phones used by the wider community today are smartphones with wide screens, large memory capacities and can not only make message or call but can make video calls [11, 12]. Mobile Learning is a learning media that uses smartphones or devices to make it easier to access teaching materials for teachers and learning materials for students without time and place restrictions [13, 14]. So that the learning media mobile -based Android is considered capable of being a solution to support students' mathematic literacy during the covid-19 pandemic. From the explanation given above, the researcher conducted an analysis of the mathematic literacy ability of junior high school student using android-based mobile learning media during covid-19 pandemic.

2 Method

The method used in this research is a qualitative approach, subjects of this study were Class VII junior high school students' in the even semester of the 2020/2021 academic year which involved 25 students who are determined by random sampling. The instruments used are mathematic literacy ability test instruments and interview guidelines. Mathematic literacy ability test questions consist of one essay question refers to the characteristics of PISA questions that have been validated by two certified mathematics teachers.

Qualitative and quantitative analysis are the analytical techniques chosen for this research. Data analysis was carried out during and after data collection and then processed systematically so that the data collected was in accordance with the research objectives. The activities carried out in the data analysis process are: 1) Qualitative, where the researcher identifies the interview guide sheet by linking the mathematic literacy test, 2) Quantitative, by examining the test sheet and analyzing the results of the mathematic literacy test in accordance with predetermined indicators, 3) Categorizing mathematic literacy ability based on good, medium and deficient criteria. The calculation of the percentage score obtained will be classified into three categories, namely good category, medium category and deficient criteria. Based on the table [15].

3 Result and Discussion

3.1 Result

The mathematic literacy ability test in this study was carried out after students carried out the learning process using android-based mobile learning media. After the test results were obtained, the researchers analyzed the students' answers according to the indicators of mathematical literacy is *formulate*, *employ*, and *interpret & evaluate* then conducted interviews with students who have the highest score. Table 3 show the results data the mathematic literacy ability of class VII students is in the medium category with an average value of 40%.

Table 4 show the results data mathematic literacy ability test which refers to the indicators in Table 2 and an interview with one of the students.

Table 2. Criteria for Assessment of Mathematic Literacy

Score Range	Criteria
$78\% < \text{Score} \leq 100\%$	Good
$37\% < \text{Score} \leq 77\%$	medium
$0\% < \text{Score} \leq 36\%$	Deficient

Table 3. Data Description of Students Mathematic Literacy

Description	Score
Average	40
Possible high score	100
Lowest score possible	0
Highest score achieved	80
Lowest score achieved	10

Table 4. Data Student Test Score Based on Indicator Mathematic Literacy

Indicator mathematic literacy	Formulate					Employ					Interpret & Evaluate				
	F.1	F.2	F.3	F.4	F.5	E.1	E.2	E.3	E.4	E.5	I.1	I.2	I.3	I.4	I.5
Percentage	96%	95%	94%	84%	82%	96%	87%	71%	57%	49%	93%	59%	42%	24%	20%
Average Score	90%					72%					48%				
Category	Good					Medium					Medium				

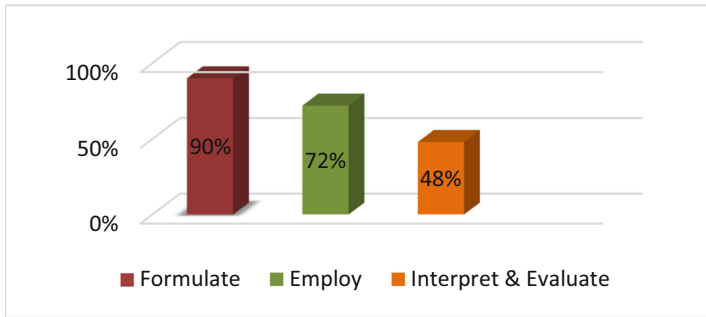


Fig. 1. Diagram of Students' Mathematic Literacy Analysis Results Using Android-Base Mobile Learning Media

Figure 1 shows that results of the analysis of students' mathematic literacy skills on the indicator *Formulate* 90% in the high category, on the indicator *employ* 72% in the medium category and on the indicator *Interpret & Evaluate* 37% with medium category.

3.2 Discussion

Analysis of the research data obtained shows that each indicator of mathematic literacy ability can be applied by students well, seen from the indicator *formulate*, obtained 96% of students can identify important facts and variables from real world problems; 95% of students can simplify situations or problems so that the results of the mathematic analysis made can be accepted; 94% of students can identify the constraints and assumptions of the chosen mathematical model and the simplified form of its context; 84% of students can Represent conditions mathematically, using appropriate variables, diagrams, symbols, and models; and 82% of students can interpret the problem into sentences that can be understood so as to find a solution. So overall, 90% of students have been able to formulate the situation mathematically.

The results of the analysis from indicators *employ*, obtained 96% of students can Define and apply concepts to get solutions; 87% of students can apply procedures, concepts, mathematical reasoning and facts to solve problems; 71% of students can create diagrams, graphs and mathematical equations to obtain the desired information; 57% of students can generalize the results of applying mathematical procedures to obtain solutions; and 49% of students can Correcting and re-explaining mathematical arguments and justifying mathematical results. So overall, 72% of students are able to use procedures, concepts, mathematical reasoning and facts.

The results of the analysis of students' mathematic literacy skills, indicators of *interpret & evaluate*, obtained 93% of students can Interpreting the results obtained in the context of the real world; 59% of students can Evaluating the feasibility of applying mathematical solutions to real world problems; 42% of students can provide an explanation of the mathematical results obtained make sense or not with the existing problems; 24% of students can Understanding the range or limits of mathematic concepts and solutions; and 20% of students can Criticize and identify model limits that can be used in solving problems. So overall, 37% of students can interpret, apply, and evaluate mathematic



Fig. 2. Display Menu mobile learning-based android

results. From the results obtained, 93% is the highest score on the indicator interpret & evaluate, this shows that most students can Interpreting the results obtained in the context of the real world without analyzing mathematic results obtained make sense or not with the existing problems, does not Understanding the range or limits of mathematic concepts and solutions and does not Criticize and identify model limits that can be used in solving problems.

The low achievement of student scores in the indicators interpret & evaluate shows that students have not been able to solve questions or problems that require logical and applicable understanding and thinking only students with high abilities can solve questions referring to level 4 PISA questions because students do not understand properly maximum of each component of the process of literacy mathematically [16–18].

Figure 2 shows that content of android-based mobile learning media can be used as a support tool in the learning process and can be a source of learning. One of the advantages of media mobile learning is that students are given convenience in carrying out learning activities without being limited by area. Another advantage of media mobile learning is the use of sophisticated, practical, and lightweight tools so that students can learn anytime and anywhere [19, 20].

Figure 3 shows that example of a mathematic literacy problem model related to the Jambi regional culture, namely the traditional food of Tepek ikan. Question models related to Jambi regional culture were chosen so that students could better understand contextual problems that are close to everyday life so that the learning process is more meaningful. Media use mobile learning related to culture is the right choice when applied to secondary school students because students at that age are prone to influenced other cultures [21, 22].

So, the results from this study showed the positive influence in the process of learning by applying media mobile learning -based android. By using media mobile learning during the Covid-19 pandemic in the learning process, it can create more interesting learning and make students more interested in learning so that they can support mathematic literacy ability.

Contoh Soal

Tepek Ikan

Tepek Ikan, satu dari sederet makanan khas Jambi, khususnya berasal dari Sekoja alias Seberang Kota Jambi. Melihat perwujudannya, makanan ini memiliki bentuk jagor perjang dengan tekstur yang empuk sedikit kenyal, hasil kombinasi adonan ikan dan sagu. Kenapa akhirnya dinamai tepek ikan, karena makanan ini dibuat dengan cara ditepek atau dipipihkan.

Beberapa ikan yang biasa digunakan untuk membuat tepek ikan adalah ikan gabus, tenggiri, ataupun belida. Ikan yang sudah di bersih kan kemudian digiling lembut. Makanan ini sering disajikan diberbagai acara masyarakat Jambi, seperti hari raya umat islam, acara pernikahan dan berbagai acara lainnya.

Bu Sita merupakan salah satu pengrajin tepek ikan yang tinggal di Jambi Kota Seberang. Setiap harinya bu Sita dapat memproduksi 4 kuali tepek ikan. Pada minggu pagi, Bu Sita pergi ke pasar dan membeli bahan untuk membuat tepek ikan. Berikut adalah bahan tepek ikan Bu Sita.

Kuali 1 2 kg ikan gabus 3 kg ikan tenggiri	Kuali 2 5 kg ikan gabus 9 kg ikan tenggiri
Kuali 3 1 kg ikan gabus 2 kg ikan tenggiri	Kuali 4 3 kg ikan gabus 5 kg ikan tenggiri

Kuali tepek ikan manakah yang memiliki rasa ikan gabus paling kuat? Jelaskan alasan kalian!

Kerjakanlah menggunakan langkah literasi matematis

Penyelesaian dengan Langkah Literasi Matematis

Merumuskan situasi secara matematis

Ditanyakan yang diketahui dan yang di tanya dari soal

Diketahui: kuali 1 berisi 2 kg ikan gabus dan 3 kg ikan tenggiri
kuali 2 berisi 5 kg ikan gabus dan 9 kg ikan tenggiri
kuali 3 berisi 1 kg ikan gabus dan 2 kg ikan tenggiri
kuali 4 berisi 3 kg ikan gabus dan 5 kg ikan tenggiri

Ditanya: Kuali tepek ikan manakah yang memiliki rasa ikan gabus paling kuat? Jelaskan alasan kalian!

Menggunakan konsep, prosedur, fakta, penalaran matematis dalam menyelesaikan masalah

Tentukan fakta, konsep, prosedur, dan penalaran matematis yang digunakan dalam menyelesaikan soal ini lalu lalu lakukan langkah pengerjaan soal

Berdasarkan:
Prosedur: membandingkan suatu bilangan konsep: perbandingan/asio
Penalaran matematis: rumus m dapat digunakan untuk menentukan kuali tepek ikan yang memiliki rasa ikan gabus paling kuat
Fakta: komposisi ikan sesuai dengan kuali yang berbeda

Langkah Penyelesaian

1) Kuali 1
banyak ikan gabus terhadap banyak ikan tenggiri
= Ikan gabus : ikan tenggiri = $2 : 3 = \frac{2}{3} = 0,6667$

2) Kuali 2
banyak ikan gabus terhadap banyak ikan tenggiri
= Ikan gabus : ikan tenggiri = $5 : 9 = \frac{5}{9} = 0,5556$

3) Kuali 3
banyak ikan gabus terhadap banyak ikan tenggiri
= Ikan gabus : ikan tenggiri = $1 : 2 = \frac{1}{2} = 0,5$

4) Kuali 4
banyak ikan gabus terhadap banyak ikan tenggiri
= Ikan gabus : ikan tenggiri = $3 : 5 = \frac{3}{5} = 0,6$

Fig. 3. (a) Sample Problems (b) Steps to Solve with Literacy Mathematic

4 Conclusion

Based on the results of the analysis of students' mathematic literacy ability using android-based mobile learning media during the covid-19 pandemic, the low scores obtained on the indicators interpret & evaluate because most students can only Interpreting the results obtained in the context of the real world without analyzing mathematic results obtained make sense or not with the existing problems, does not Understanding the range or limits of mathematic concepts and solutions and does not Criticize and identify model limits that can be used in solving problems. Overall, the students' mathematical literacy test results are in the medium category. So the use of android-based mobile learning media can be used as a support for the learning process during the Covid-19 pandemic and can support students' mathematic literacy.

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